

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: MAIL STOP 1800, PATENT CENTER
WASHINGTON, D.C. 20540
WWW.USPTO.GOV

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/974,922	10/09/2001	Michael N. Grunbergen	5762	1090

32888 7590 12/04/2002

APPLIED MATERIALS, INC.
2881 SCOTT BLVD. M/S 2061
SANTA CLARA, CA 95050

EXAMINER

MEYER, DAVID C

ART UNIT PAPER NUMBER

2878

DATE MAILED: 12/04/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/974.922

Examiner

David C Meyer

Applicant(s)

GRIMBERGEN MICHAEL N

Art Unit

2878

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED. 35 U.S.C. § 133.
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on 09 October 2001
- 2a) ☐ This action is FINAL 2b) ☐ This action is non-final
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213

Disposition of Claims

- 4) ☐ Claim(s) 1-35 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration
- 5) ☐ Claim(s) _____ is/are allowed
- 6) ☐ Claim(s) 1-5, 8-16 and 19-35 is/are rejected
- 7) ☐ Claim(s) 6, 7, 17 and 18 is/are objected to
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement

Application Papers

- 9) ☐ The specification is objected to by the Examiner
- 10) ☐ The drawing(s) filed on _____ is/are a) ☐ accepted or b) ☐ objected to by the Examiner
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is a) ☐ approved b) ☐ disapproved by the Examiner
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f)
- a) ☐ All b) ☐ Some * c) ☐ None of
- 1 ☐ Certified copies of the priority documents have been received
- 2 ☐ Certified copies of the priority documents have been received in Application No. _____
- 3 ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application)
- a) ☐ The translation of the foreign language provisional application has been received
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s): _____
- 4) ☐ Interview Summary (PTO-413) Paper No(s): _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other

DETAILED ACTION

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this

Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States

Claims 1, 3-4, 9-12, 14-16, and 19-35 are rejected under U.S.C. 102(b) as being anticipated by Burns et al (US Patent 4,687,539). Burns et al discloses a metrology system for detecting an endpoint in a semiconductor wafer manufacture process.

Regarding claims 1 and 12, Burns et al discloses a pulse light drive circuit (Fig. 2) for semiconductor metrology apparatus comprising a pulse light source (dye laser 28), a light detector (photomultiplier tube 48), and a drive circuit comprising a signal processing circuit (integrator 84, pulse generator 51, and delay generator 78) and, as part of a trigger circuit, a cut off switch (power switch 52) adapted to cut off energy to the light source after a predetermined pulse light integrated intensity level is detected by the light detector.

While Burns et al does not explicitly disclose an energy source, an energy source is an inherent part of any pulse light drive circuit. Furthermore, Burns states that when the signal outputted from the photomultiplier tube is integrated (by integrator 84) and determined to be larger than a specific voltage, a power

switch (52) is opened, thereby shutting off power to the pulse generator (51) portion of the drive circuit.

The light source (28) is disposed to irradiate a light beam (30) into the reactor chamber (70) of a semiconductor manufacturing system. (See Fig. 2 and column 5, line 63 to column 6 line 56.)

Regarding claims 23 and 31, Burns et al discloses a method for effecting endpoint detection in a semiconductor wafer manufacturing process wherein: power is connected to a light source (28) and a light event (30) generated in a process reactor (70) of a semiconductor wafer manufacturing system; light (32) is detected in the process reactor and converted into a light intensity value by photomultiplier tube (48); light intensity value is integrated by an integrator (84) or a computer (94); the integrated light intensity value is compared to a predetermined light intensity value; and power to the light source is disconnected by means of a power switch (52) when the light intensity signal and the predetermined light intensity signal are the same. (See Fig. 2 and column 5, line 63 to column 6 line 56. Also, see Fig. 3 and column 7, line 5 to column 8, line 35.)

The examiner notes that in the cited disclosure, two light sources are disclosed. Excimer laser (20) is used to process a semiconductor wafer, while dye laser (28) is used to detect an endpoint in a manufacture process. Schematic figures 2 and 3 show both the excimer laser and the dye laser as being connected to the drive circuitry. Hence, when power is cut off from the excimer

Art Unit: 2878

laser light source it is also cut off from the dye laser light source in a manner consistent with and anticipatory of the claimed method.

Regarding claims 3-4, 14-15, and 24-25, Burns et al discloses that pulses are filtered through a wavelength selective element (monochromator 38) prior to being detected by the light detection device (48).

Regarding claims 8 and 19, Burns et al discloses a metrology apparatus comprising a cut-off switch (52) that cuts off power to the pulse drive circuit and light source (28) and an integrator (84) connected between the light detector and the cut-off switch (Fig. 2 and column 5, line 63 to column 6 line 56).

Regarding claims 9, 20 and 28, Burns et al discloses a computer (94) that performs a function of pulsing light source (28) repeatedly and for a predetermined duration. Because computer (94) is the functional equivalent of a cut-off switch that is repeatedly turned on and off, Burns et al anticipates the invention of claims 20 and 28. (See Fig. 3 and column 7, line 5 to column 8, line 35.)

Regarding claims 10-11, 21-22, 26-27, 29-30 and 33-35, Burns et al discloses a light detector that detects a plurality of light pulses emitted by light source (28) and produces a light intensity value. An integrator (84) integrates the light intensity signal of each pulse and the combined intensity of the plurality of light pulses. Once a predetermined threshold voltage is exceeded, power to the light source is cut off. Collectively, the light pulses introduced into reactor chamber (70) constitute a light event.

Art Unit: 2878

Regarding claim 32, while Burns et al does not state the the light event may consist of a single light pulse, in practice, it is possible that a single light pulse could cause the threshold voltage to be exceeded and the cut-off switch to disconnect power to the light source. Hence, the light event generated in the reactor chamber may consist of a single light pulse.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 2, 5, 13, and 16 are rejected under U.S.C. 103(a) as being unpatentable over Burns et al (US Patent 4,687,539) in view of Filo (US Patent 5,705,808).

Regarding claims 2 and 13, Burns et al does not disclose a capacitor energy source, but does disclose that light sources other than dye lasers, such as resonance lamps, may be used in a pulse light drive circuit (column 9, lines 1-5). It is well known to use a capacitor to provide energy to a resonance lamp used in a pulse light drive circuit as Filo teaches (Fig. 3, flash tube 252 and capacitor 210). It would have been obvious to one of ordinary skill in the art at the time of invention to substitute a flash tube and capacitor energy source in order to, for example, reduce the cost of manufacturing a metrology apparatus.

Art Unit: 2878

Regarding claims 5 and 16, Burns et al discloses a light detector (48) that produces a light intensity signal, which an integrator (84) integrates into an integrated light intensity signal (column 6, lines 16-56).

Allowable Subject Matter

Claims 6-7 and 17-18 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Regarding claims 6-7 and 17-18, the prior art of record does not disclose or make obvious a pulse light drive circuit for semiconductor metrology apparatus having a trigger switch that is connected between a threshold comparator and a capacitor that provides energy to a pulse light source.

Conclusion

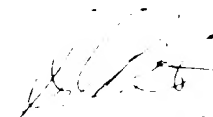
Any inquiry concerning this communication or earlier communications from the examiner should be directed to David C Meyer whose telephone number is 703-305-7955. The examiner can normally be reached on M-F 8:30-5:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Porta can be reached on 703-308-4852. The fax phone numbers for the organization where this application or proceeding is assigned are 703-872-9318 for regular communications and 703-872-9319 for After Final communications.

Art Unit: 2878

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0935.

DCM
November 27, 2002


DAVID FORTA
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2800